

THAT WHICH IS CLAIMED IS:

1. A system for the solid phase polymerization of polymers wherein cold amorphous polymer is introduced to one or more crystallizers and heated to crystallize the polymer, the crystallized polymer is discharged to a reactor for polymerization of the polymer, and the hot polymer product of the reactor is discharged to a fluid bed cooler for cooling of the polymerized product, said fluid bed cooler including an inlet for the hot polymer and an inlet for gas used for agitating the fluid bed, and means for discharging the cooled polymer and the off-gas from the cooler after contact of the gas with the polymer, and including at least one spray nozzle located in said cooler at a position adjacent the upper level of the polymer in the cooler, and means for introducing water through said nozzle and into said cooler for contact of the water with the polymer to achieve cooling of the polymer as a result of the vaporization of the water.
2. A system according to claim 1 wherein said inlet for the hot polymer is located at one end of the cooler, said at least one spray nozzle and a means for discharging the off-gas being positioned in the vicinity of said one end of the cooler, said means for discharging the cooled polymer being positioned at the opposite end of said cooler.
3. A system according to claim 1 wherein at least two spray nozzles, located in side-by-side relationship, are positioned in the cooler.
4. A system according to claim 1 wherein said at least one spray nozzle is located at a position between 5 inches above said upper level and 5 inches below said upper level.
5. A system according to claim 1 wherein said at least one spray nozzle is located 2 to 5 inches above said upper level.

6. A system according to claim 1 wherein said at least one spray nozzle is located 2 to 5 inches below said upper level.
7. A system according to claim 1 wherein the gas introduced for agitating the fluid bed undergoes heat exchange with the polymer whereby drying and some cooling of the polymer is achieved by means of the gas, said gas being introduced into the cooler at several times the minimum fluidization velocity for the polymer and at a total flow rate required for achieving drying and cooling of the product.
8. A system according to claim 1 wherein the gas introduced for agitating the fluid bed is air.
9. A system according to claim 2 wherein said cooler includes an upper chamber in which off-gas is collected, the moisture content of the polymer and the humidity of the off-gas being higher in the area of said chamber located adjacent said one end of said cooler and then gradually decreasing toward the opposite end of said cooler, an underflow weir provided for dividing the fluid bed cooler and said upper chamber into separate zones, and at least two off-gas outlets defined by said upper chamber to serve as said means for discharging the off-gas, one of said at least two outlets communicating with the area of said chamber located adjacent said one end of said cooler whereby the off-gas with higher humidity can be discharged therethrough, said weir dividing said area from the remainder of said chamber whereby the polymer adjacent said opposite end of the cooler is not exposed to the higher humidity environment.
10. A system according to claim 9 including a separate zone in said cooler into which the polymer moves after passing said underflow weir, the temperature of the polymer and the moisture content of the polymer gradually decreasing as the polymer approaches said opposite end of the

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12. A system according to claim 1 wherein a transition zone is provided at the lower end of said reactor, and means for introducing cooling gas into said transition zone for lowering the temperature of the polymer prior to discharge of the polymer into the fluid bed cooler.

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